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EXAMINER	
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2881	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,572	GREEN ET AL.	
	Examiner	Art Unit	
	MICHAEL MASKELL	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-110* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *59 and 60* is/are allowed.

6)☒ Claim(s) *1-58 and 61-110* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 2-8, 10, 12-15, 18-20, 22, 25, 26, 31-35, 39-43, 49, 67, 68, 74, 75, 77-80, 82 and 84-91 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. These claims comprise only functional limitations depending from claims drawn to apparatus. Apparatus claims are limited only by structural elements (MPEP 2114).

2. Claims 2, 3, 7, 8, 18, 19, 31, 67, 68, 71, 72, 75, 78, 79, 80, 94, 97, 98 and 99 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. These limitations comprise groups of overlapping ranges, with the highest and lowest ranges being open ended. Any possible value would therefore fall within the scope of these claims, and they provide no limitation whatsoever to their parent claims. In addition to this objection, these claims will be rejected as anticipated or obvious by any prior art that anticipates or renders obvious their parent claims.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-26, 29, 37-49, 51-53, 56-58, 61-63, 65 and 92-94 rejected under 35 U.S.C. 102(b) as being anticipated by Green, et al (GB 2388704).

Regarding claim 1, Green discloses a mass spectrometer comprising:

an ion beam attenuator ("ion optical device" in claim 1 has use as an attenuator) for transmitting and attenuating a beam of ions, wherein, in use, said ion beam attenuator is repeatedly switched between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% (this limitation does not have patentable weight due to lack of structural embodiment - see MPEP 2114; nevertheless, the limitation is disclosed in claim 18 of Green).

Claims 2-8 do not further limit the apparatus of claim 1 (see claim objections above), and are thus anticipated for the same reasons given in re claim 1.

Regarding claim 9, Green discloses a control device (claim 52) wherein, in use, said control device adjusts either the time period T1 and/or the time period T2 in order to adjust or vary the transmission or attenuation of said ion beam attenuator (this limitation does not have patentable weight due to lack of structural embodiment - see MPEP 2114; nevertheless, the limitation is disclosed in claims 70-73 of Green).

Claim 10, does not further limit the apparatus of claim 1 (see claim objections above), and is thus anticipated for the same reasons given in re claim 1.

Regarding claim 11, Green discloses an ion detector (claim 52) wherein in

either said first mode of operation and/or said second mode of operation at least a portion of the beam of ions is substantially directed towards said ion detector and wherein said ion detector measures the ion current of said beam of ions (this limitation does not have patentable weight due to lack of structural embodiment - see MPEP 2114; nevertheless, this is what the effect of the ion optical device is).

Claims 12-15, do not further limit the apparatus of their parent claims (see claim objections above), and are thus anticipated for the same reasons as their parent claims.

Regarding claim 16, Green discloses wherein said ion beam attenuator comprises one or more electrostatic lenses (claim 61).

Regarding claim 17, Green discloses wherein said one or more electrostatic lenses comprise one or more electrodes (claim 61) and wherein one or more voltages are applied to said one or more electrodes in said first mode of operation and wherein one or more second different voltages are applied to said one or more electrodes in said second mode of operation (this limitation does not have patentable weight due to lack of structural embodiment - see MPEP 2114; nevertheless, this limitation is disclosed by Green at claims 57-59).

Claims 18-20 do not further limit the apparatus of their parent claims (see claim objections above), and are thus anticipated for the same reasons as their parent claims.

Regarding claim 21, Green discloses wherein said one or more electrostatic lenses comprise at least first, second and third electrodes or first, second and third pairs of electrodes (claim 58).

Claim 22 does not further limit the apparatus of its parent claims (see claim

objections above), and is thus anticipated for the same reasons as its parent claims.

Regarding claims 23 and 24, Green discloses a differential pumping exit plate having an aperture (10).

Claims 25 and 26, do not further limit the apparatus of their parent claims (see claim objections above), and are thus anticipated for the same reasons as their parent claims.

Regarding claim 29, Green discloses a mass filter arranged upstream and/or downstream of said ion beam attenuator (mass analyzer in claim 52).

Regarding claim 37, Green discloses a mass analyzer (claim 52).

Regarding claim 38, Green discloses mass analyzers selected from the claimed group (claim 74).

Claims 39-43 do not further limit the apparatus of their parent claims (see claim objections above), and are thus anticipated for the same reasons as their parent claims.

Regarding claim 44, Green discloses ion sources selected from the claimed group (claim 77).

Claims 45 and 46 claim the same structural limitations as claims 1 and 9, and are rejected for the same reasons given above.

Claims 47-49 and 51 claim the same structural limitations as claims 1 and 37, and are rejected for the same reasons given above.

Claims 52 and 53 claim the same structural limitations as claim 1, and are rejected for the same reasons given above.

Regarding claim 56, Green discloses a method of mass spectrometry

comprising:

repeatedly switching an ion beam attenuator between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% (claims 1, 15 and 18).

Regarding claim 57, Green discloses a method of mass spectrometry comprising:

attenuating an ion beam passing through an ion beam attenuator, wherein during one cycle said ion beam attenuator: (a) substantially attenuates said ion beam for a time period T1 during which time the transmission of ions exiting the ion beam attenuator is substantially 0%; and then (b) substantially transmits said ion beam for a time period T2 so that ions exit the ion beam attenuator (claims 1, 15 and 18).

Regarding claim 58, Green discloses a method of mass spectrometry comprising:

attenuating a beam of ions by repeatedly switching an ion beam attenuator between a first mode of operation and a second mode of operation; and

mass analyzing or acquiring, histogramming, accumulating, recording or outputting mass spectra, mass spectral data or mass data in an asynchronous manner to the switching between modes of said ion beam attenuator (claim 1).

Regarding claim 61, Green discloses a method of mass spectrometry comprising:

attenuating an ion beam by an attenuation factor by repeatedly switching an ion beam attenuator on and off and wherein when said ion beam attenuator is switched on

ions are attenuated substantially 100%; and

altering or varying the ratio of the time that said ion beam attenuator is on to the time that said ion beam attenuator is off in order to vary said attenuation factor (claims 1, 15, 18-20).

Regarding claim 62, Green discloses a method of mass spectrometry comprising:

repeatedly chopping, blocking or 100% deflecting or retarding an ion beam and then transmitting said ion beam in order to attenuate said ion beam (claims 1, 15 and 18).

Regarding claim 63, Green discloses a method of mass spectrometry comprising:

attenuating an ion beam wherein the degree of attenuation of said ion beam is determined by setting a mark space ratio of a device (claims 1, 15 and 18-20).

Regarding claim 65, Green discloses a mass spectrometer comprising:

an ion beam attenuator (claim 1) for transmitting and attenuating a beam of ions; and

switching means for switching between an attenuation mode of operation wherein an ion beam is attenuated and a non-attenuation mode of operation wherein an ion beam is substantially unattenuated, wherein said attenuation mode of operation is repeatedly switched between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% (claims 15 and 18-20).

Regarding claim 92, Green discloses a method of mass spectrometry comprising:

providing an ion beam attenuator for transmitting and attenuating a beam of ions; and

switching between a non-attenuation mode of operation wherein an ion beam is unattenuated and an attenuation mode of operation wherein an ion beam is substantially attenuated, wherein in said attenuation mode of operation said ion beam attenuator is repeatedly switched between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% (claims 1, 15 and 18-20);

providing a mass analyzer downstream of said ion beam attenuator; and

wherein said mass analyzer obtains, in use, first mass spectral data during said non-attenuation mode of operation and second mass spectral data during said attenuation mode of operation;

said method further comprising:

interrogating said first mass spectral data;

determining whether at least some of said first mass spectral data may have been affected by saturation, distortion or missed counts; and

using at least some of said second mass spectral data instead of at least some of said first mass spectral data if it is determined that at least some of said first mass spectral data has been affected by saturation, distortion or missed counts (claim 1).

Regarding claim 93, Green discloses regularly and/or repeatedly switching said

ion beam attenuator between said non-attenuation mode of operation and said attenuation mode of operation (claims 1, 15 and 18-20).

Claim 94 does not further limit claim 92 (see claim objections above), and is rejected for the same reason as the parent claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 27 rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Takahashi (U.S. Patent 5,083,020).

Regarding claim 27, Green discloses the apparatus of claims 1-26, but fails to teach wherein said ion beam attenuator comprises a mechanical shutter or mechanical ion beam attenuator; however, Takahashi teaches that a mechanical shutter was known in the prior art to serve as an alternative to ion optical elements such as those used by Green (column 4, lines 39-47). Because these elements were known to serve as acceptable alternatives to each other in a mass spectrometer, it would have been obvious to one of ordinary skill in the art to replace Green's ion optical system with a mechanical shutter for attenuating the ion beam.

7. Claim 28 rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Horton (U.S. Patent 4,160,161).

Regarding claim 28, Green discloses the apparatus according to claims 1-26,

but fails to teach wherein said ion beam attenuator comprises a magnetic ion gate or magnetic ion beam attenuator; however, Horton teaches that magnetic means were known in the prior art to deflect or defocus an ion beam as an alternative to mechanical or electrostatic means (column 4, line 56-column 5, line 4) as used in Green. Because magnetic deflection/defocusing means were known in the prior art for use in mass spectrometers as an alternative to electrostatic optics, and deflection/defocusing through electrostatic means is what Green uses for ion beam attenuation, it would have been obvious to one of ordinary skill in the art to substitute a magnetic ion beam attenuator for Green's electrostatic optics. Doing so would provide the predictable result of providing the same ion beam attenuation.

8. Claims 30-36, 50, 54, 55 and 64 rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Krutchinsky, et al (U.S. Patent 6,331,702 B1).

Regarding claims 30 and 36, Green discloses the mass spectrometer according to claims 1-26, but fails to teach one or more ion guides or one or more gas collision cells arranged upstream and/or downstream of said ion beam attenuator; however, Krutchinsky teaches that it was known in the art to incorporate a multipole ion guide/collision cell (114) into a mass spectrometer so that fragmentation studies can be performed. It would have been obvious to one of ordinary skill in the art to add Krutchinsky's collision cell to Green's mass spectrometer when fragmentation studies are desired.

Claims 31-35 do not further limit their parent claims (see claim objections above), and are therefore rejected for the same reasons given above.

Regarding claims 50 and 54, Green discloses a mass spectrometer comprising:

an ion beam attenuator (claim 1);

a mass analyzer (claim 1);

Green does not disclose an ion guide or gas collision cell; however, as discussed above, Krutchinsky teaches the use of a multiple ion guide/collision cell (114) in a mass spectrometer such as Green's. Krutchinsky further teaches that the ion guide/collision cell is arranged to convert a non-continuous beam of ions into a substantially continuous beam of ions (abstract). For the reasons already given in re claim 30, it would have been obvious to one of ordinary skill in the art to add Krutchinsky's ion guide/collision cell to Green's mass spectrometer. The final limitation of claim 50, "wherein, in use, said ion beam attenuator is switched between a first mode of operation and a second mode of operation at least 10, 20…or 100 times faster than said mass analyzer mass analyzes or acquires, histograms, accumulates, records or outputs mass spectra, mass spectral data or mass data" does not impart any structural limitation to the claim, and therefore cannot patentably distinguish over the combination of Green and Krutchinsky.

Regarding claim 55, Green discloses means for repeatedly switching said ion beam attenuator on and off (claim 1); and

means for varying the mark space ratio of a switching cycle, wherein the mark space ratio is the ratio of the time period during which an ion beam is attenuated to the time period during which an ion beam is transmitted (claims 15-20).

Claim 64 is the method of providing the apparatus of claim 30, and the same rejection is applicable *mutatis mutandis*.

9. Claims 66-91 and 95-110 rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Smith, et al (U.S. Patent 5,073,713).

Regarding claim 66, Green discloses a mass spectrometer comprising:

an ion beam attenuator (claim 1) for transmitting and attenuating a beam of ions; and

switching means for switching between a first attenuation mode of operation wherein an ion beam is attenuated by a first factor and a second attenuation mode of operation wherein said ion beam is attenuated by a second different factor (claims 1 and 15-20);

Green fails to teach wherein said first attenuation mode of operation of said ion beam attenuator is repeatedly switched between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% with a first mark space ratio; and

wherein in said second attenuation mode of operation said ion beam attenuator is repeatedly switched between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% with a second different mark space ratio.

Smith, however, teaches that it was known in the prior art to provide two modes with different duty cycles (one short and one long) to the deflector that transmits or blocks ions into a mass spectrometer such as Green's (column 19, lines 29-32). Doing

this allows the acquisition of an autocorrelation spectrum that can derive sibling relationships between fragments in the mass spectrum (column 19, line 66-column 20, line 7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Green's mass spectrometer such that each mode of operation has a different duty cycle (synonymous with "mark space ratio") in order to provide autocorrelation data.

Claims 67 and 68 do not further limit claim 66 (see claim objections above), and are therefore rejected for the same reasons as claim 66.

Claims 69 and 70 are methods of using the apparatus of claim 66, and the same grounds of rejection are applicable *mutatis mutandis*.

Claims 71 and 72 do not further limit their parent claims (see claim objections above), and are therefore rejected for the same reasons as their parent claims.

Regarding claim 73, in addition to the ion beam attenuator and switching means recited identically in claim 66 above, Green discloses a mass analyzer and control system wherein said mass analyzer obtains, in use, first mass spectral data during said non-attenuation mode of operation and second mass spectral data during said attenuation mode of operation, and wherein said control system further performs the steps of:

interrogating said first mass spectral data;

determining whether at least some of said first mass spectral data may have been affected by saturation, distortion or missed counts; and

using at least some of said second mass spectral data instead of at least some of said first mass spectral data if it is determined that at least some of said first mass spectral data has been affected by saturation, distortion or missed counts (claim 1).

Claims 74 and 75 do not further limit their parent claims (see claim objections above), and are rejected for the same reasons as their parent claims.

Claim 76 adds to claim 73 the limitations of wherein said first attenuation mode of operation of said ion beam attenuator is repeatedly switched between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% with a first mark space ratio; and

wherein in said second attenuation mode of operation said ion beam attenuator is repeatedly switched between a first mode of operation wherein the ion transmission is substantially 0% and a second mode of operation wherein the ion transmission is >0% with a second different mark space ratio.

As shown in re claim 66, the addition of these limitations to Green is obvious in view of Smith.

Regarding claims 81 and 83, Green discloses an orthogonal acceleration Time of Flight mass analyzer (Fig. 2) comprising an electrode (11) for orthogonally accelerating ions into a drift region, said electrode being repeatedly energized. The limitation “wherein said control system determines if an individual mass peak in said first (or second) mass spectral data exceeds a first (or second) predetermined average number of ions per mass to charge ratio value per energisation of said electrode” is purely functional and has no patentable weight (MPEP 2114).

Claims 77-80, 82, 84, and 85-91 do not further limit their parent claims (see claim objections above), and are therefore rejected for the same reasons as their parent claims.

Claim 95 is the method of using the apparatus of claim 76, and the same rejection is applicable *mutatis mutandis*.

Regarding claim 96, Green discloses repeatedly switching between said first mode of operation and said second mode of operation (claim 2).

Claims 97-99 do not further limit their parent claims (see claim objections above), and are therefore rejected for the same reasons as their parent claims.

Claim 100 is the method of using the apparatus of claim 81, and the same rejection is applicable *mutatis mutandis*.

The limitations of claim 101 are disclosed by claim 32 of Green.

Claim 102 is the method of using the apparatus of claim 83, and the same rejection is applicable *mutatis mutandis*.

The limitations of claim 103 are disclosed by claim 34 of Green.

The limitations of claim 104 are disclosed by claim 35 of Green.

The limitations of claim 105 are disclosed by claim 36 of Green.

The limitations of claim 106 are disclosed by claim 37 of Green.

The limitations of claim 107 are disclosed by claim 38 of Green.

The limitations of claim 108 are disclosed by claim 39 of Green.

The limitations of claim 109 are disclosed by claim 40 of Green.

The limitations of claim 110 are disclosed by claim 41 of Green.

Allowable Subject Matter

10. Claims 59 and 60 allowed.

11. The following is an examiner's statement of reasons for allowance: The prior art does not teach or suggest switching the ion beam attenuator between a first mode of operation and a second mode of operation faster than the mass analyzer acquires, histograms, accumulates, records or outputs mass spectra. Green discloses switching the ion beam attenuator between the first and second modes of operation at frequencies of up to 10 Hz (claim 72), but is silent on the frequency with which the mass analyzer acquires, histograms, accumulates, records or outputs mass spectra. Acquiring, histogramming, accumulating, recording or outputting mass spectra at a frequency of less than 10 Hz would not have been obvious to one of ordinary skill in the art, as this would result in an inefficient and longer than necessary run time to acquire a full mass spectrum. The present application, by contrast, teaches switching between first and second modes of operation at much higher frequencies (claim 75), allowing the mass analyzer to operate at a suitably high frequency that is nevertheless lower than the switching frequency.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL MASKELL whose telephone number is (571)270-3210. The examiner can normally be reached on Monday-Friday 8AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571/272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael Maskell/
Examiner, Art Unit 2881
03 June 2009

/David A Vanore/

Primary Examiner, Art Unit 2881